

## APPENDIX H

### CRANE AND DERRICK INSPECTION CRITERIA

WHEN TO INSPECT	TYPE OF INSPECTION
Prior to initial use - all new cranes <sup>(a)</sup>	Initial Inspection
Prior to use - all altered cranes <sup>(b)</sup>	Initial Inspection
Prior to initial use on a Corps project <sup>(c)</sup>	Periodic Inspection
Periodically (1-12 months) after initial use on a Corps project	Periodic Inspection
Prior to every operation (shift)	Start-up Inspection
Before using a crane which is not in use on a regular basis and which has been idle for more than 1, but less than 6, months <sup>(d)</sup>	Frequent Inspection
Before using a crane which is not in use on a regular basis and which has been idle for more than 6 months <sup>(d)</sup>	Periodic Inspection
Standby cranes, at least semi-annually <sup>(e)</sup>	Frequent Inspection
Standby cranes, prior to use <sup>(f)</sup>	Frequent Inspection

(a) performed by manufacturer

(b) "altered" is defined as any change to the original manufacturer's design configuration, that is, replacement of weight handling equipment parts and components with parts or components

(c) initial use refers to (1) the first time the Corps takes possession of and assembles a crane, or (2) whenever a contractor brings a crane onto a job site and assembles the crane

(d) this requirement is in addition to the requirement for a periodic inspection

(e) standby cranes are those cranes which are not used on a regular basis but are available - on a standby basis - for emergencies (e.g., emergency O&M work); requirements for frequent inspections of standby cranes are in addition to the requirement for a periodic inspection

(f) in addition to the semi-annual frequent inspection, a frequent inspection shall be conducted prior to use

### **CRITERIA FOR STARTUP INSPECTIONS**

1. All control mechanisms for maladjustment interfering with proper operation.
2. All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
4. All chords and lacing.
5. All hydraulic and pneumatic systems - with particular emphasis given to those which flex in normal operation of the crane.
6. Hooks and latches for deformation, chemical damage, cracks, and wear.
7. Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer's specifications.
8. Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
9. Hydraulic system for proper oil level.
10. Tires for recommended inflation pressure (mobile cranes).
11. Wedges and supports for looseness or dislocation (climbing tower cranes).
12. Braces and guys supporting crane masts; anchor bolt base connections for looseness or loss of preload (tower cranes and derricks).
13. Derrick mast fittings and connections for compliance with

manufacturer's recommendations.

14. Barge or pontoon ballast compartments for proper ballast; deckloads for proper securing; chain lockers, storage, fuel compartments, and battening of hatches; fire fighting and lifesaving equipment in place and functional; hull void compartments sounded for leakage (floating cranes and derricks).

### **CRITERIA FOR PERIODIC INSPECTIONS**

1. Foundation or supports for continued ability to sustain imposed loads.
2. Braces supporting crane masts (towers) for safe condition; anchor bolt base connections for tightness or retention of preload; wedges and supports of climbing cranes for tightness and proper positioning.
3. Guys for proper tension.
4. For derricks, inspect all chords and lacing, tension in guys, plump of the mast, and derrick mast fittings and connections for compliance with manufacturer's recommendations.
5. Crane structure and boom and jib members, and their connections, for absence of deformation, cracks, or corrosion.
6. Bolts, rivets, nuts, and pins for tightness.
7. Proper tension (torque) of high strength (traction) bolts used in connections and at the slewing bearing.
8. Power plants for performance and compliance with safety requirements.
9. Electrical apparatus for proper functioning and absence of signs of excessive deterioration, dirt, and moisture accumulation.

10. Hydraulic and pneumatic tanks, pumps, motors, valves, hoses, fittings, and tubing for proper functioning and absence of damage, leaks, and excessive wear; hydraulic and pneumatic systems for proper fluid/air levels.

11. All control mechanisms for adjustment for proper operation, no excessive wear of components, and absence of contamination by lubricants or other foreign matter.

12. Drive components such as pins, bearings, wheels, shafts, gears, sheaves, drums, rollers, locking and clamping devices, sprockets, drive chains or belts, bumpers, and stops for absence of wearing, cracks, corrosion, or distortion.

13. All crane function operating mechanisms for proper operation, proper adjustment, and the absence of unusual sounds.

14. Travel, steering, holding, braking, and locking mechanisms for proper functioning and absence of excessive wear or damage.

15. Tires for damage or excessive wear.

16. Brake and clutch system parts, linings, pawls, and ratchets for absence of excessive wear.

17. Wire rope. Visually inspect all running ropes; visually inspect all counterweight ropes and load trolley ropes, if provided. Visual inspections should concentrate on discovering gross damage, such as that listed below, which may be an immediate hazard: particular attention should be given to boom hoist ropes and sections of rope subject to rapid deterioration such as at flange points, crossover points, and repetitive pickup points on drums.

- a. distortion of rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion;
- b. general corrosion;

c. number, distribution, and type of visible broken wires;

d. broken or cut strands;

e. core failure in rotation resistant ropes (care shall be taken when inspecting rotation resistant ropes because of their susceptibility to damage from misuse and potential for deterioration when used on equipment with limited design parameters).

f. reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.

g. severely corroded or broken wires at end connections; severely corroded, cracked, bent, worn, or improperly applied end connections.

Care shall be taken when inspecting rope sections subject to rapid deterioration, such as the following: sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited; sections of the rope at or near terminal ends where corroded or broken wires may protrude; sections subject to reverse bends; and sections of rope which are normally hidden during routine visual inspections, such as parts passing over outer sheaves.

18. Sheaves for the absence of cracks in the flanges and spokes.

19. Rope for proper spooling onto drum(s) and sheave(s) and proper reeving.

20. Hooks and latches for absence of deterioration, chemical damage, cracks, and wear.

21. Crane operator aids (safety devices) and indicating devices for proper operation.

22. Motion limiting devices for proper operation with the crane unloaded (each motion should be inched into its limiting device to run in at slow speed with care exercised) and load limiting devices for proper operation and accuracy of settings.

23. Load, boom angle, load or load moment indicating, wind, and other indicators for proper operation and accuracies within the tolerances recommended by the manufacturer.

24. Safety and function labels for legibility and replacement.

25. For floating plant, inspect ballast compartments for proper ballast; deckloads for proper securing; safety of chain lockers, storage, fuel compartments; battening of hatches; hull void compartments sounded for leakage; tie-downs for barge-mounted land cranes for absence of wear, corrosion, and tightness; cleats, bitts, chocks, fenders, capstans, ladders, stanchions for absence of corrosion, wear, deterioration, and deformation; take four corner draft readings.

#### **CRITERIA FOR FREQUENT INSPECTIONS**

1. Braces supporting crane masts (towers) for safe condition; anchor bolt base connections for tightness or retention of preload; wedges and supports of climbing cranes for tightness and proper positioning.

2. Guys for proper tension.

3. For derricks, inspect all chords and lacing, tension in guys, plump of the mast, and derrick mast fittings and connections for compliance with manufacturer's recommendations.

4. Electrical apparatus for proper functioning and absence of signs of excessive deterioration, dirt, and moisture accumulation.

5. Hydraulic and pneumatic tanks, pumps, motors, valves, hoses, fittings, and tubing for proper functioning and absence of damage, leaks, and excessive wear; hydraulic and pneumatic systems for proper fluid/air levels.

6. All control mechanisms for adjustment for proper operation, no excessive wear of components, and absence of

contamination by lubricants or other foreign matter.

7. All crane function operating mechanisms for proper operation, proper adjustment, and the absence of unusual sounds.

9. Wire rope. Visually inspect all running ropes; visually inspect all counterweight ropes and load trolley ropes, if provided. Visual inspections should concentrate on discovering gross damage, such as that listed below, which may be an immediate hazard: particular attention should be given to boom hoist ropes and sections of rope subject to rapid deterioration such as at flange points, crossover points, and repetitive pickup points on drums.

a. distortion of rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion;

b. general corrosion;

c. number, distribution, and type of visible broken wires;

d. broken or cut strands;

e. core failure in rotation resistant ropes (care shall be taken when inspecting rotation resistant ropes because of their susceptibility to damage from misuse and potential for deterioration when used on equipment with limited design parameters).

f. reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires.

g. severely corroded or broken wires at end connections; severely corroded, cracked, bent, worn, or improperly applied end connections.

10. Rope for proper spooling onto drum(s) and sheave(s) and proper reeving.

11. Hooks and latches for absence of deterioration, chemical damage, cracks, and wear.

12. Crane operator aids (safety devices) and indicating devices

for proper operation.

13. Motion limiting devices for proper operation with the crane unloaded (each motion should be inched into its limiting device to run in at slow speed with care exercised) and load limiting devices for proper operation and accuracy of settings.

14. Load, boom angle, load or load moment indicating, wind, and other indicators for proper operation and accuracies within the tolerances recommended by the manufacturer.

15. Safety and function labels for legibility and replacement.

16. For floating plant, inspect ballast compartments for proper ballast; deckloads for proper securing; safety of chain lockers, storage, fuel compartments; battening of hatches; hull void compartments sounded for leakage.

## **APPENDIX I**

### **CRANE TESTING REQUIREMENTS FOR PERFORMANCE TESTS**

1. Performance testing includes both operational performance testing and load performance testing. The following tables and their associated guidelines are of a general nature. For any crane, the manufacturer's guidance has precedence over this general guidance and the manufacturer's guidance shall be followed.

2. The following sequence and limitation shall be complied with when conducting performance tests:

- a. Test rigging first.
- b. Conduct the operational performance test before the load performance test.
- c. Test the main hoist before testing the auxiliary or whip hoists.
- d. Test loads shall be raised only to a height sufficient to perform the test.

3. Operational performance testing. Operational performance testing shall include the tests specified in Table I-1, as defined below.

X1 = load hoist operation and limit switch test. (1) raise the load hook through all controller points stopping below the upper limit switch (where applicable); (2) slowly raise load hook into the upper limit switch to establish that limit switch is operating properly; (3) slowly raise hook through the upper limit switch by using limit switch bypass (where applicable); (4) lower load hook below the upper limit switch using all the lowering control points; (5) slowly lower load hook into the lower limit switch to establish that limit switch is operating properly.